

Charp., *Pl. giornae* and *G. rufus*, L., were both abundant and active, as though in midsummer, and I flushed *O. caerulescens*, and it did one good to see the blue flash of his wings when one knew winter was almost upon us, especially as the previous afternoon I had been down to the bottom of the garden and found no Orthoptera left. But the final goodbye to this long and splendid, but to me, entomologically speaking, wasted, summer, was on October 23rd. This was a warm day, but the sky was rather overcast and the long-awaited rain seemed to be coming at last; there was a gusty wind and the dust was unpleasant. Still, we were able to lunch in the open air, and out for a stroll I picked up *St. bicolor*, a few pairs of *Pl. giornae* and a female *Caloptenus italicus*, L. That night there was a violent thunderstorm, and we looked out of the window next morning to see the countryside under a thick mantle of snow.

Later notes:—On the morning of 26th I found a belated male *Phaneroptera falcata* in the house, seeking refuge from the winter outside.

On 28th, a week after the first snow and several cold nights, I heard *Eph. ritium*, a single specimen, chirping as though to keep himself warm, after dark. This very late date shows what a hardy species this is, and helps to explain the fact that it is the only member of this family to extend beyond the boundaries of its warm, original home, in the Western Mediterranean countries, to Central and Western Europe.

November 1st.—The summer has returned; once more lunch in the garden, and on a sunny hillside found *St. bicolor*, *St. elegans*, *Gomphocerus rufus* and *Pl. giornae*, the first chirping away busily, for sheer light-heartedness, the mating season being long over.

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### Notes on *Zygæna rubicundus*, Hb.; *Z. erythrus*, Hb., and on the races of *Z. purpuralis*, Brünn, in Europe.

By ROGER VERITY, M.D.

This little group of species is interesting because it constitutes one of the extreme variations of the *Zyganæ*, that in which the nervural pattern exists alone. The result is that also the red markings of the secondary pattern form bands parallel to the neurulation and are never divided up into spots, as in most species of the genus. A vestige of the true or transverse pattern only occurs exceptionally in very dark individuals of the male sex found in the northern races of *purpuralis*: form *semaculata*, Burgeff, in which the median and the posterior red bands are each divided in two. In *erythrus* there occurs the very rare *verityi*, Stefanelli [*Bull. Soc. Ent. Ital.*, lx., p. 255 (1909)], in which the median band is thus divided.

That these three species are perfectly distinct there can be no doubt, their larvæ are quite distinct from each other; that of *rubicundus* was discovered by Querci and described and figured in Oberthür's *Études de Lépidopt. Comparée*, v., fig. 824, and vi., p. 164. The imagines also bear constant differential features. *Z. rubicundus* always has white legs in both sexes and a white collar and epaulettes; these characters are only met with in the female of *erythrus* and very rarely and to a slight degree in that of *purpuralis*; in *rubicundus* the

space between the hindermost nervure, or second anal, of forewing, and the dorsal margin is entirely red; in *erythrus* there is a little red triangle at its base and the rest is dark; in *purpuralis* the base is invariably dark, and a dark streak along the dorsal margin always connects it with the outer-marginal band even when the anterior part of that space is red along the nervure; this character always allows one to separate the three species, even in the very extensively red specimens, which resemble each other most. Querci has found *rubicundus* and *purpuralis* together in the Sibillini Mts. and in the Mainarde Mts., and *erythrus* in a spot not far from them in the latter locality.

It is worthy of notice that the most extensively red *Zygena* known, *rubicundus*, another of the most constantly red species, *erythrus*, and the reddest European races of *purpuralis* are proper to peninsular Italy, that is to say to the very region in which most species of this genus produce their most melanic races. It might appear at first sight that the *purpuralis* group reacts to the same surroundings in a way exactly inverse to the more usual one. Further consideration shows us that the same phenomenon occurs, on the contrary, throughout the genus: the nervural pattern reaches its full extent in the moist and colder climate of Central Europe, and tends to disappear in the arid and warmer southern regions; the primary, true or transverse pattern behaves exactly the other way, on broad lines. The result is that *purpuralis*, which has no transverse pattern, is left with very little dark marking in the south; *Z. carniolica*, Scop., which has a very limited capacity of developing a nervural pattern, is much more broadly red in the northern regions of its habitat and in the high mountains of the south. I have pointed out that species like *Z. filipendulae*, L., dealt with at length in a paper in these columns, in which both the nervural and the transverse patterns exist together and can both develop to a marked degree, produce their comparatively reddest races in an intermediate zone and develop darker races, due to the nervural pattern, to the north of this, and darker races, due to the transverse pattern, to the south. A beautifully harmonious law of variation thus unfolds itself before our eyes.

#### RACES OF *Z. RUBICUNDUS*, Hb.

This species may be said to be the least variable of the genus. Only once has Querci found a remarkable individual variety of the male in which the two cubital nervures of forewing were bordered with dark scales, so that the dark marginal band exhibited a projection towards the cell, similar to the one usually seen in the form of *purpuralis*, known hitherto as *polygala*, Esp.; to this form I have given the name of *polygalaformis* (*Bull. Soc. Ent. Ital.* xlvii. (1915), p. 71). In 1916 I suggested in the *Bull. Soc. Ent. de France*, p. 287, that some unusual looking specimens of *Zygena* collected by Ragusa at Palermo might belong to a Sicilian race of *rubicundus* resembling *erythrus* much more than the usual continental one; this assumption I based on the fore-legs of the male, which are white; I called this form *erythraeformis*. I must say however that I should like more materials to confirm this hypothesis, because the specimens in question might very well only be some weakly *erythrus*. The most northern locality known of *rubicundus* are the Sibillini Mts. (Piceno), where Querci has discovered

it and found it from Macerata up to as high an altitude as 1,200 m. (Bolognola).

#### RACES OF *Z. ERYTHRUS*, HB.

This species varies more than the preceding, but always remarkably little as compared to most others of this genus. Forms *irpina*, Zickert, and *verityi*, Stefanelli, constitute the least and the greatest degrees in the development of the dark pattern. Local variations consist chiefly in differences in the average size, but everywhere individual variation is very great in this respect. As Hübner's figure represents one of the largest forms, the name of *magna* published by Seitz is useless. Staudinger, in fact, only used it in his Price List for commercial purposes. On the contrary the opposite variation is well worth naming.

RACE MISERRIMA, mihi: Specimens I have received from Signor G. Gianelli of Turin and which he states he has collected on Mount Musinè, a hill near that town, have an aspect so different from the usual *erythrus* that for some time I could not make out whether they belonged to this species or to *purpuralis*. It was only when I established the constant differential character between the two, mentioned above, that I satisfied myself they must be *erythrus*. Both sexes only expand about 28mm., as compared to the usual 35 and 36 average; the result is they give the impression of only being about half the usual size. The scaling is very thin, the colour pale; the red markings are very extensive and confluent, as in the *irpina* form.

RACE ALBIPES, Verity (*Bull. Soc. ent. France*, 1916, p. 289): This is the large, brilliantly coloured Sicilian race, in which sometimes the male, as well as the female, has whitish legs and in which the latter exhibits the brighter silvery gloss already noted by Oberthür as characteristic of Sicily.

#### RACES OF *PURPURALIS*, BRÜNN.

Comparing series of this species I possess from various localities I notice that they are strikingly different from each other and it seems quite remarkable that they should not yet have been described. Beginning by those in which the dark markings are less extensive, I must first of all recall the discovery made by Burgeff (*Mitt. Münchner Entom. Ges.*, v., 1914, p. 42) that the specimen called *polygalae* by Esper is not, as was believed, a *purpuralis*, but a very unusually red *filipendulae*; the "type" is in the Nat. Hist. Museum of Wiesbaden. I notice that this fits in much better with certain details in Esper's figure and description than did the form of *purpuralis* it was usually referred to. Burgeff replaces the name of *polygalae* by that of *minos*, Herr.-Schäff. What I must point out is that this will not do: the name *minos* was not created by Herr.-Schäff.; it first appears three quarters of a century earlier in the *Syst. Verzeichniss der Schmett. der Wiener Gegend*, p. 45, and it is only a synonym of *purpuralis*, for which species it has been used by many. One might call RUBROTECTA, mihi, the individual form, whatever race it occurs in, in which the neuration is entirely covered over by red scaling and the resulting uniform patch spreads further back than the second anal, or hindmost, nervure on a greater or lesser extent of the latter, never reaching however the

margin. A transition to this form is *erythrusoides*, Rocci (*Atti Soc. Ligustica Scienze Nat. e Geogr.*, 1918); here the red markings are very extensive, but they are separated into bands by the darkened neurulation; Rocci says in his description that there is "a red dash at the back of the hindmost nervure, as in *erythrus*, Hb., but less marked." I made him note that this could not be correct, because the chief specific difference between *erythrus* and *purpuralis* consists in the fact that the former has the base of the wing between that nervure and the dorsal margin constantly occupied by a red triangular patch, whereas in *purpuralis* that area is always dark and a dark streak extends from it along the dorsal margin, however great the extent of the red may be, as stated above. He answered I was quite right and that his description would have to be modified in this sense.

Race *MIRABILIS*, mihi. Burgeff says very rightly that form *minus*, as he calls *rubrotecta*, rises to be a "subvariety" in Southern and Central Italy, because its percentage surpasses that of the typical form. Something more, however, must be said about it: Querci has found at S. Fili, m. 900, on the Coast Range of Calabria what may well be called the finest race known of *purpuralis*. It is larger and more robust than any other; the dark markings are blackish; the red ones are also very saturated, so that a rich effect of colouring is produced; the red is unquestionably more extensive than in any other race and the most extreme examples of *rubrotecta* predominate in the female and are quite frequent also in the male. A race transitional to this one has been found in the Aurunci Mts., north of Naples, which might be called *mirabilis* trans. ad *jiorii*.

Race *FIORII*, Costantini (*Att. Soc. dei Naturalisti e Matematici in Modena*, serie V., vol. iii., 1916). Described from the Emilian Apennine (Cimone, Fiumalbo, Tagliole), this race seems to be quite the same in the whole of Central Italy; I possess series from localities as varied as that of "types," Palazzuolo di Romagna, Sasso di Castro, Mt. Senario (near Florence), the Sibillini Mts., the Mainarde (north of Naples). This is a much smaller and frailer insect than *mirabilis*, usually less highly coloured and often less densely scaled; the extent of the red is on the whole distinctly lesser, but it certainly comes next to it by the frequency of form *rubrotecta*, not unfrequent even amongst the males. A remarkable fact is, that notwithstanding this tendency to reduce the dark scaling of forewing, the hindwing has quite a comparatively broad marginal band, which in some individuals extends all along it, in a way not seen in any other race, except the darkest Alpine ones. The male and female figured by Seitz under the name of *polygalae* on Pl. 4 of *Gross-schmett.* are a fair representation of race *jiorii*, and no doubt they are Italian, as Northern and Central Italy is the habitat given for *polygalae* in the text.

Race *ISARCA*, mihi. The specimens collected by Wagner in the Isarco Valley in South Tyrol are very large and bright; the red is extensive, but not quite as much as in the Italian races just described; it does not extend further back than the second anal nervure, but the middle band spreads out at its further end in a broad fan-shaped area; the tone is of a slightly lighter carmine than in the races just mentioned and in the other Alpine ones, with a suspicion of yellow mixed in it, which makes it more brilliant and recalls the same difference existing in the series of *Z. filipendulae* race *ochsenheimeri*,

Brk., from those two regions. This fine race is probably that of many low, warm valleys in the Southern Alps.

RACE MAGNALPINA, mihi. Corresponds to nymotypical *filipendulae* of the Alps, as *isarca* corresponds to *ochsenheimeri*. No doubt it is the most widespread race of the species in the Alps and in the Hautes Pyrénées. It is that which Oberthür [*Ét. d'Ent.*, viii., p. 27 (1884)] says is, round Cauterets, "superb, large, vividly coloured, about similar to the one found at Zermatt." He adds that in the Ariège, near Ax, one finds a smaller type, more vermilion in colour; this, I presume, is transitional to *nubigena*, Led. Race *magalpina* is not quite so large as *isarca*; its chief characteristic is the intensity of the colouring; the dark markings are very opaque and black; the red is saturated and even colder than in *mirabilis*; its extent is considerably lesser than in the races described above; the fan-shaped area at the end of the median band is small. The hindwings have a slight black suffusion along outer margin. The series of Gêdre, m. 1000 (Htes-Pyr.), received from Rondou is the most blackish I have seen, probably on account of the local causes which produce, there, also race *tristis*, Obth., of *Z. achillae*, Esp. From Mt. Boron (Alpes-Maritimes Département) I have a pair of specimens which seem race *isarca* trans. ad. *magalpina*.

RACE PARVALPINA, mihi. At the Baths of Valdieri, m. 1375, in the Piedmontese Maritime Alps, I have collected a race which cannot be referred to the preceding on account of its much smaller size and on account of the distinctly more reduced extent of the red bands; the form usually called *pluto*, Ochs. (see this race, below), is very frequent; the hindwings have in most males a narrow, but distinct dark band along the whole of the outer margin. It otherwise agrees with *magalpina* in the intensity and tone of colouring.

RACE NUBIGENA, Led. [*Verh. zool.-bot. Ver. Wien*, ii., p. 93 (1852)]. Briefly, but effectively, described as "very thinly scaled (like *A. erulans*) the red of a pale crimson, the border of the hindwings rather convex," from a single male of the Pasterze glacier on the Gross Glockner. One might add that the body is covered with long hairs and that the red pattern is more extensive than in the two previous races. It is the race of very high altitudes, corresponding to *mannii*, H.-S., and *paulula*, Vrt., of *filipendulae*, L. I have Welsh specimens which are perfectly similar to my Alpine *nubigena*, Led. (not Birchall), and very distinct indeed from any other race. Tutt says the British specimens he has seen are identical with the continental type *purpuralis*, but whether he actually means the nymotypical race of Denmark it is not made clear. Anyhow it seems likely that these northern races should resemble each other.

RACEMOS, Schiff. (see above) = PLUTO, Ochs. [*Die Schmetterlinge*, II., p. 26 (1808)]. The name *pluto* is generally used, not for a race, but for the striking individual form in which the red bands are shortened so considerably that the median one ends abruptly just beyond the extremity of cell with a sharp rounded outline, its usual fan-shaped expansion being entirely obliterated. If we refer to Ochseneimer's description, we find all he says of the red pattern is as follows: "the red spots are finer, the third is wedge-shaped and shorter, fading off towards the outside into the ground colour." The habitats he gives are "Hungary and the neighbourhood of Vienna." I have a little series from the latter

locality, received from Höfer, and I find that all the other characters given by Oechsenheimer describe it admirably; broader wings than in northern races, darker colouring, as in *magalpina*, "black border of hindwing broadens at the angle." As to the red bands, one of my males does correspond exactly to the form usually called *pluto*, but the rest are only transitions to it, and Oechsenheimer's words fit them much better than they do this form. I conclude that this author never had in mind the individual form to which his name has been arbitrarily given, and that he meant his inclusive description for the entire race of the region mentioned. Original descriptions must be taken as they stand and the totality of their meaning must be taken into account when applying the name they refer to. We must, however, note that, taken in this sense, *pluto* next falls before *minos*, Schiff., also described from Vienna. I suggest the name of *PLUTONIA* for the individual form described above, independently of the race it may be found in.

Race *BOSNIACA*, Burgeff (*Mitt. Münchener Ent. Ges.*, V., p. 43, tav. v., fig. 1-3 (1914)). I am not acquainted with this race, described from the Vlasic Mts., m. 1800, in Bosnia. It is described as "larger and more thickly scaled than *pluto*, O., of the Eastern Alps and having a darker appearance," the median red band of forewing extends towards the margin; the male has a marginal dark band on hindwing; the females are dusted with grey.

Race *NORMANNA*, mihi. This name I propose for the peculiar little race of Northern France, which Oberthür has noticed and described at length (*Ét. Léop. Comp.*, iv., p. 425) and of which I have received a series of Pont-de-l'Arche (Eure) from L. Dupont. It is one of the smallest races of this species; the dark scaling has a more brilliant indigo gloss than in any other race, in the male, and a silvery one in the female; the red is not very saturated and it is limited in extent, the bands being distinctly separated from each other and short, so that the anterior, or subcostal one, ends at the level at which the median one begins; examples transitional to form *interrupta*, Stågr., are thus quite frequent. The most peculiar character of this race, however, consists in the way in which, in the great majority of individuals, the median band is shaped at its further end: before the second median nervure it is quite as short and ends as abruptly as in form *plutonia*; instead, between this nervure and the first cubital or, in other words, on both sides of the third median, it extends outwardly in a long projection, sometimes nearly as far as the outer margin. In my paper on *Zygaena filipendulae*, L., I have pointed out that this particular character in the pattern of the *purpuralis* group shows the origin of the sixth spot in the former, making it particularly interesting. I think that here, as in other cases, the local race, with its various distinctive features, should receive one name and another should be given to the form exhibiting the last characteristic mentioned, so that it can be used to designate the individuals of the other races in which it is met with not uncommonly. The name of *INCISA* seems suited, because the red projection described is due to a more or less deep incision of the dark marginal band in the atrophied zone, as explained in the aforesaid paper.

Race *JURAE*, mihi. My large series of specimens, collected at Dombresson, m. 1000, in the Jura, by the late and much regretted

Bolle, belongs to a race quite apart from those I have described. It is more variable individually than any other and a considerable number of examples exhibit a type of structure quite unknown in the preceding races, on account of the shape of the wings, very narrow and elongated, with a sharp apex and the outer margin falling off rapidly, so that the anal angle forms a very broad curve. This shape points to that of *Hepialus humuli*, Z., and other low groups of Lepidoptera and, in fact, to that of the *Myrmeleonidae* Neuroptera, suggesting that this form of *purpuralis* may be one of the most primitive *Zygæna*. The scaling in the whole of this race is very thin, except in a few individuals, and the wings have quite a shiny surface, dark greenish indigo in male and silvery in female. The size is also very variable, but, on an average, about medium, as compared to the remaining races. The antennæ are longer and sometimes more slender than in the preceding ones. The variation in the pattern of the wings is greater than in any other race I have seen; it begins in both sexes by the most extreme *rubrotecta*, differing from the ones of Central Italy only by the fact that the red does not extend at the back of the second anal nervure and that it is so pale and transparent as to give quite a different look to the insect; all gradations are then found up to the other extreme form *interrupta*, Stdgr.; as a rule, however, even when the red bands are narrow, the median one extends well towards the outer margin either with the entire fan-shaped area or with the projection of *incisa*, and I have only one male which approaches form *plutonia*, even that one not quite reaching it. The capillary black streak on fringes of hindwing is nearly invariably excessively thin and in the female often interrupted by entirely red scales; in two example of this sex no trace of black is left, and the fringe is entirely pale red (form *RUBROFIMBRIATA*, *mibi.*), a form I have seen in no other race.

Race HERINGI, Zeller [*Stett. Ent. Zeit.*, V., page 42 (1844)]. I am not acquainted with this race from Stettin. The original description is not sufficient to give one a clear idea of it, to begin with because one does not know what race of "*minos*" its author compares it to. The antennæ are said to be more slender and the wings broader, a combination which would be certainly very unusual and nearly incredible; the red markings extend considerably towards the outer margin, "the middle spot . . . expanding suddenly very considerably;" the males have a little gray at the apex of the posterior wings. Hering still sustained in 1881 that this was a distinct species from *purpuralis*. Staudinger in his *Catalog* of 1901 does not even admit it as a variety, saying the larva is different, but the imago is very inconstant. Seitz makes very little of it, simply mentioning it in a few words. I am obliged to leave it at this.

Race *PURPURALIS*, Brunn. I am sorry not to have seen the nymotypical race from the Zealand island, the most important island of Denmark. Judging from German specimens of various localities, I presume that the races of this country belong on the whole to the same group as *jura*, always being thin-scaled and usually narrow-winged. The Danish one, no doubt, resembles them considerably and so does the British one.

The European races of *purpuralis* can, on broad lines, be divided into three groups: one, with very extensive red scaling, from the south, another, with that colour reduced to narrow bands, more or less

separate from each other, from the southern part of Central Europe, and a third, with elongated wings and thin scaling, found, as a rule, further north.

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### The Eastern Pyrenees, 1921.

By D. H. PEARSON, F.E.S.

Last year my brother and I were in the central and western Pyrenees, and this year decided to go further east. Leaving London at 8.20 a.m. on June 24th, we arrived at Vernet-les-Bains on the afternoon of the 25th. All the large hotels were shut up, but we stayed very comfortably at the pension of Madame Massina. After a cup of tea we started out for a short walk, and were delighted to take two *Melanargia lachesis*. The next morning we took a nice little series of this species, which became commoner as the days went on, but when we left Vernet, on July 5th, I realised that nearly all the captures were males, and we afterwards took a number of ♀s at Molitg-les-Bains. The species shows considerable variation. The markings are practically the same as in *galathea*, except that the black at the base of the upper wing and the central band in lower wing are replaced by the ground-colour. In most specimens there is a faint discoidal lunule, and in some this is composed of purple scales instead of the ground-colour. On the underside the hindwing has usually three spots at the anal angle, sometimes two, and occasionally four, and two spots near the costa, as in *galathea*. In two specimens these two costal spots appear on the upperside of the wing, and there are faint traces of them in others. Some have three well defined spots on the upperside in a complete ring of ground colour, some have two, some one. A few show no trace of spots, and some are represented by a tiny patch of purple scales. There is also considerable variation in the black submarginal band, which in one or two specimens is carried right round the lower wing with only a trace of the usual ground colour gap. They are all noticeably darker than specimens I have seen from Spain. The centres of the eye-spots are purple, in some consisting of a large patch, and in others confined to a few purple scales. These purple spots do not seem to be mentioned in descriptions of the species, though Kane refers to them in *syllius*, *arge*, and *ives*. On looking through my series of *galathea* I find several which have these purple eye-spots, viz., from Polegate, Monkswood, Lulworth, Luchon, Briançon, etc., so that they appear to be common to the family. A few specimens of *lachesis* were taken with a yellow ground colour (var. *canigulensis*), but though we netted and examined a considerable number we failed to turn up the var. *catalenica*, and understand from a local entomologist that this is a very rare form. I really ought to have taken a longer series, but that brother of mine looked upon me as a Herod among the Innocents, and I weakly allowed my ardour to be damped. From the train we saw what appeared to be *lachesis* most of the way up to Mont Louis, but we did not meet with it at Mont Louis itself. *M. galathea* was not seen at all during our trip, though it was common last year at Gavarnie.

On June 26th we took our first *Laeosopis roboris*, and managed during the next week to get a nice series of this insect. Our best locality was a steep bank under a watercourse on the left bank of the stream outside the grounds of the Grand Hotel, and we also took them